

CEC TURNTABLE

Service Manual

**DIRECT DRIVE AUTOMATIC
TURNTABLE**

DD-8200



CEC International Inc.

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Model	Destination
A	USA (UL Approval)
C	Canada (CSA Approval)
E	Europe (Scandinavian Approval)
G	General territories

TECHNICAL SPECIFICATIONS

Description	Condition	Nominal	Limit
Type		Direct drive, front operation auto-return system	
Platter		Aluminum alloy die-cast, 31 cm featuring stroboscopic calibrated spots with neon lamp	
Motor		20-pole, 30-slot DC servo direct drive motor	
Speed		2-speeds: 33-1/3 rpm, 45 rpm	
Speed calibration		±3%	±2.8%
S/N ratio	DIN 45539A	48 dB	45 dB
	DIN 45539B	70 dB	68 dB
Wow & Flutter	Measured at 3 kHz signal	0.03% WRMS	0.038% WRMS
	DIN 45507	0.05%	0.06%
Tone arm			
Headshell		Plug-in type	
Overall length		300 mm	
Effective length		215 mm	
Overhang		15 mm	
Adjustable force range		0 to 2.5g/1 turn of the scale ring (directly readable in 0.5g steps)	
Acceptable cartridge weight		4 to 12g	
Cartridge (Model G)		VC-10 Dual Magnet type	
Frequency response		20 — 20,000 Hz	
Output voltage		2.5 mV at 1 kHz 3.54 cm/sec.	1.8 — 3.5 mV at TRS-1004 record
Channel difference		2 dB at 1 kHz	
Channel separation		20 dB at 1 kHz	16 dB at 1 kHz at TTR-102 record
Tracking force		2 grams	
Stylus tip		0.6 mil diamond stylus	
Power source	Model A and C	117 Volts, AC 60 Hz	
	Model E	117/220 Volts switchable, 50/60 Hz	
	Model G	117/220 Volts switchable, 50/60 Hz	
Power consumption		3.5 watts	
Dimension		156(H) x 457(W) x 350(D) mm	
Weight		10 kg (Net)	

DISASSEMBLY INSTRUCTIONS

1. TOOLS REQUIRED FOR DISASSEMBLY

Phillips-head screwdrivers (for M5 and M3)
 Slotted-head screwdrivers (medium and small sizes)
 Radio pliers
 Hexagon-head wrench (for hexagon socket headless set screw M4)
 Nippers
 Hexagon box type screwdrivers (for M5 and M3)

2. DO THE FOLLOWING PRIOR TO DISASSEMBLY:

- (1) Remove the dust cover.
- (2) Remove the turntable platter.
- (3) Fix the tone arm in place with the lock-lever of the arm rest.
- (4) Place the set on a suitable bench with the bottom base upward. (Fig. 1)

3. REMOVE THE MOTOR

- (1) Remove with a Phillips-head screwdriver the eight screws which hold the bottom base (Fig. 1).
 NOTE: One of the eight screws is placed behind the audio-insulated leg A as shown in Fig. 1.
- (2) Remove the return plate ⑩ and return arm ⑧.
- (3) Disconnect with a nipper the lead wires of servo controller circuit board except for one from motor.
- (4) Remove the servo controller circuit board from the P.C.B. mounting spacer ⑧7.
- (5) Disconnect with a nipper the grounding wire of motor (Fig. 2).
- (6) Place the set on a suitable bench with the surface of chassis upward.
- (7) Remove the drive gear ⑤.
- (8) Remove the three screws A which fasten the motor. (Fig. 3)
 Then the motor can be removed.

4. REMOVE THE TONE ARM

- (1) Remove the return plate. ⑩
- (2) Remove the shield case ③9, disconnect from the shield connector plate the lead wires coming from the tone arm and remove the wirings.
- (3) Loosen the screw ②18 which is placed in the tone arm fixing plate and remove the tone arm fixing plate ④0.
- (4) Remove the tone arm mounting nut ①56.
- (5) Place the set on a suitable bench with the surface of chassis upward.
- (6) Remove the three screws B described in Fig. 3.

5. REMOVE THE VARIABLE RESISTOR

- (1) Remove the front panel ③1 from the cabinet.
- (2) Tear the pitch control nameplate ③3 down from the front panel and remove the two screws ②10 which fasten the variable resistor.

6. REMOVE THE SUB-CHASSIS

- (1) Remove the tone arm.
- (2) Remove the three M5 screws ②08 and the thirteen screws ②20 which mount the sub-chassis to the

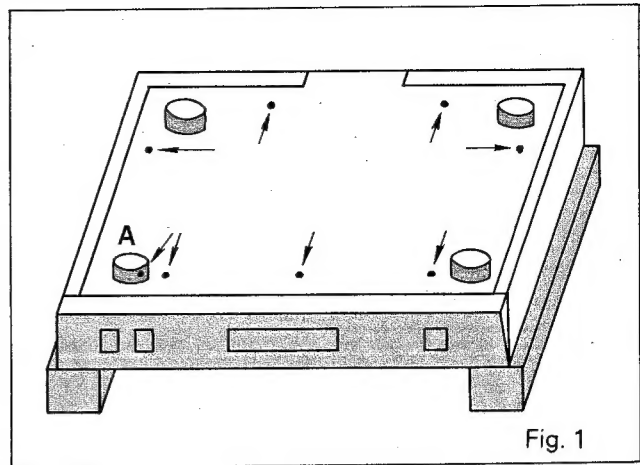


Fig. 1

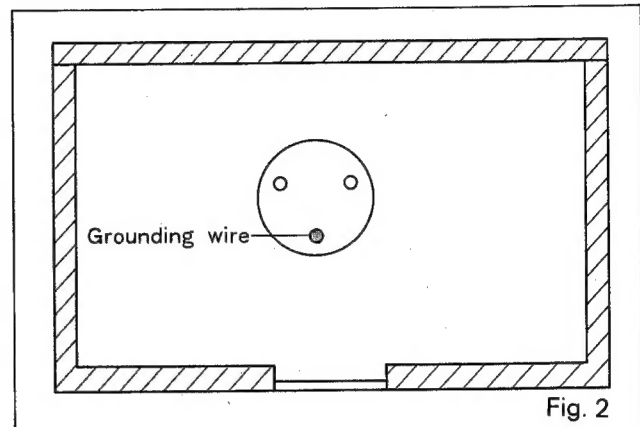


Fig. 2

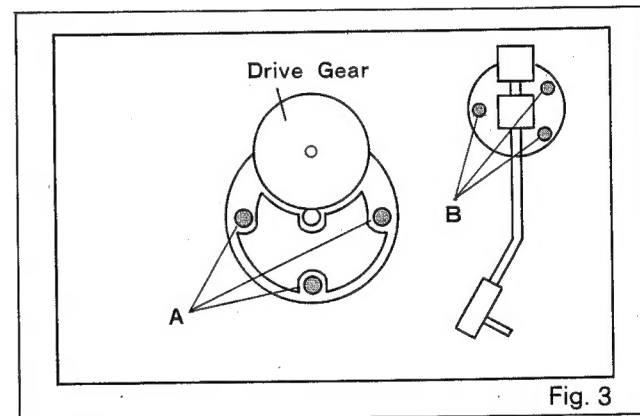


Fig. 3

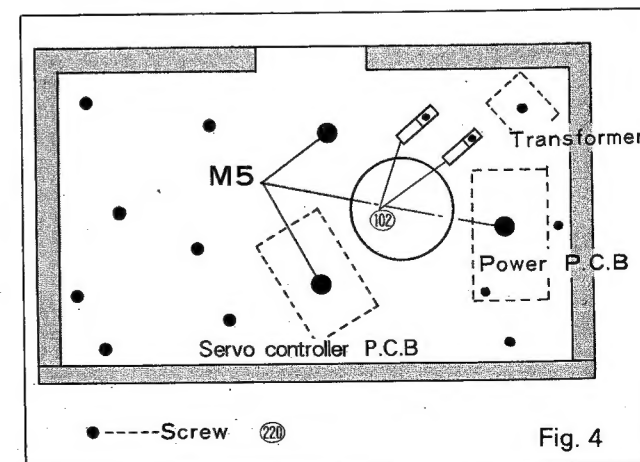


Fig. 4

cabinet (Fig. 4).

- (3) Remove the terminal plate ⑨⑧.

ADJUSTMENTS

1. TOOLS REQUIRED FOR ADJUSTMENTS

Small level indicator
Hexagon box type screwdriver
Phillips-head screwdriver (M3)
Slotted-head screwdrivers (smaller size)

Note: Be sure to set the bench for adjustment level and shut the power off.

2. STYLUS POINT HEIGHT

Place the set with the bottom base removed on a stable table, set the turntable platter, the platter mat and a record, and check the level of the turntable with a level indicator.

(1) Auto Up

Adjust the height from the record surface to the stylus point in the following order so that it conforms to the dimensions shown in Fig. 5 during auto return:

- Set the stylus down at slightly outside position from the end sound groove of a record (65 – 70R from the turntable shaft).
- Push the reject lever and slowly turn the turntable platter so that the tone arm starts auto return operation.
- Stop the rotation of the turntable platter before the tone arm passing over the edge of a record and measure the gap between the stylus point and record surface.
- If the gap is not within the dimensions specified in Fig. 5, turn the lifter shaft as shown in Fig. 6, and adjust the height referring to the below.

Less than 5 mm	Turn clockwise
More than 10 mm	Turn counter-clockwise

(2) Manual Up

Adjust by turning the nut in Fig. 7 so that the gap between the stylus point and record surface becomes equal to that at the time of auto up when the cueing lever is set to the ▼ position.

3. MOTOR MOUNTING POSITION

- Loosen the screws A in Fig. 3 which hold the motor.
- Push ratchets A and BL attached to the drive gear as far as possible in the direction of the arrow shown in Fig. 8.
- Move the motor so that the gap between the turntable gear and ratchet A becomes as shown in Fig. 8. and tighten the screws.

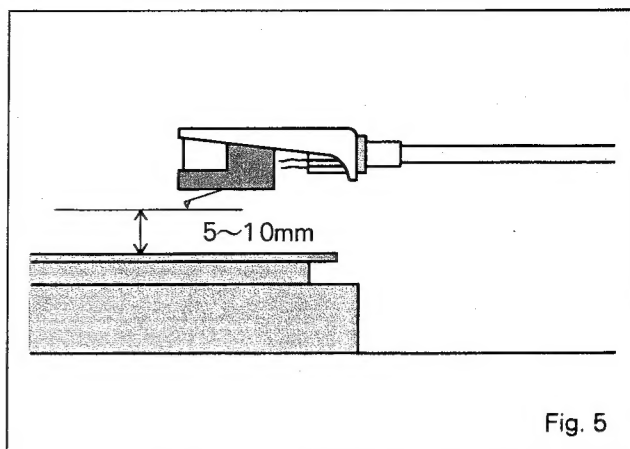


Fig. 5

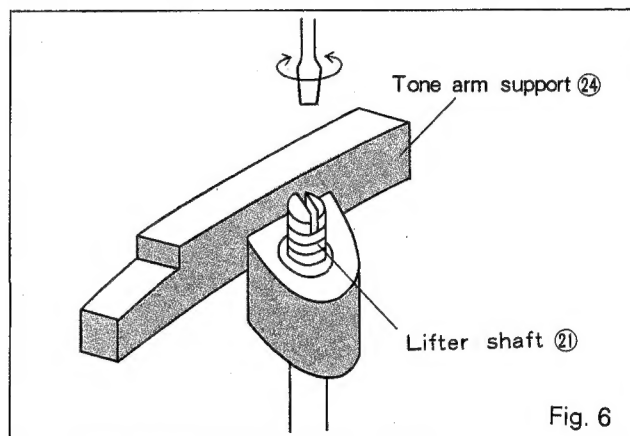


Fig. 6

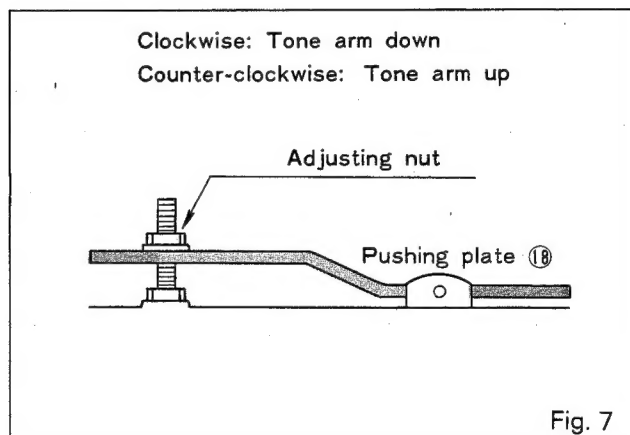


Fig. 7

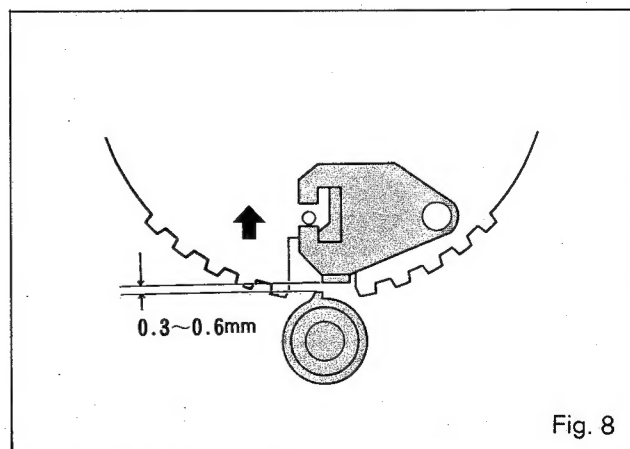


Fig. 8

4. AUTO RETURN MECHANISM

- (1) Make sure the tone arm fixing plate is properly installed as shown in Fig. 9.
- (2) Put on a record and set the stylus down slightly outside the end sound groove or 65 – 70R from the center of the turntable. When the record ends, make sure the tone arm automatically returns from any of the following positions:
 - (a) For LP records, a click is heard when the stylus is between 53 and 57.5 R and then the tone arm automatically returns.
 - (b) For EP records, a click is heard when the stylus is between 48.5 and 53 R and then the tone arm automatically returns.
 - (c) For the auto return test record (CEC RG-652), a click is heard when the stylus is between 55 and 61 R and then the tone arm automatically returns.
- (3) If the tone arm does not automatically return from all of the above positions, turn the adjusting hexagon bolt in Fig. 9 to adjust the tone arm return position. Clockwise turning of the screw brings the return position close to the center of the turntable and counter-clockwise turning of the screw moves the return position away from the center of the turntable.

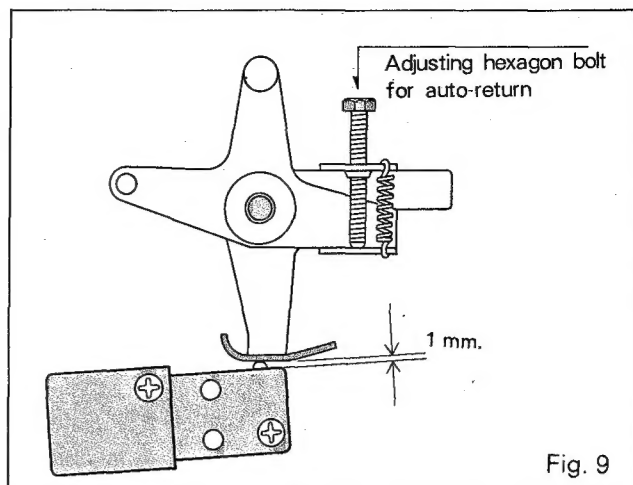


Fig. 9

5. TURNTABLE SPEED

The rotating speeds of the turntable can be adjusted to minimum $\pm 2.8\%$ with the pitch control knob. If the specified adjusting range cannot be obtained, adjust as follows:

- (1) Place the pitch control knob at the center.
- (2) Remove the platter and put the speed adjusting label off from the cabinet.
- (3) Rotate from the two holes beneath the speed adjusting label the semi-fixed variable resistors. Check to see if the strobo indexes appear stationary after placing turntable platter (Fig. 10).

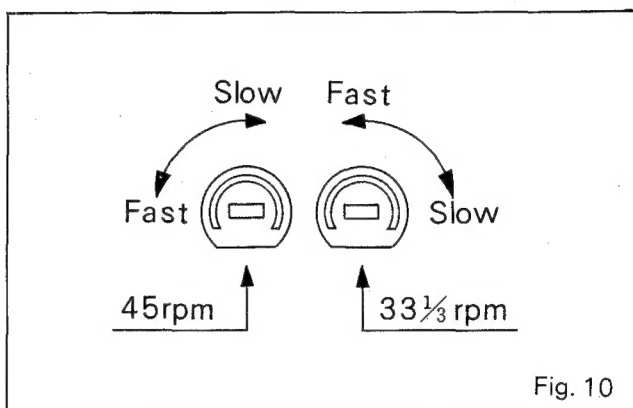


Fig. 10

6. VOLTAGE CHANGEOVER (MODEL E AND G)

- (1) Voltage changeover mechanism is placed at the rear of the cabinet. Remove the screw which fastens the protector and remove the protector (Fig. 11).
- (2) Withdraw the plug and reinsert it in such a way that the desired voltage marking is exposed in the cut of the plug.
- (3) Fasten the protector with the screw.

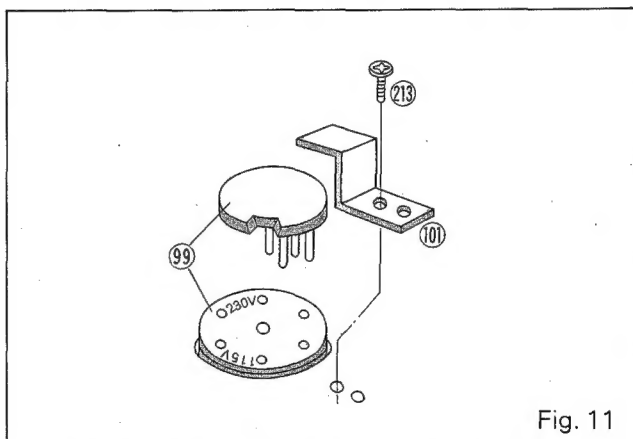


Fig. 11

CORRECT POSITION OF RETURN ARM

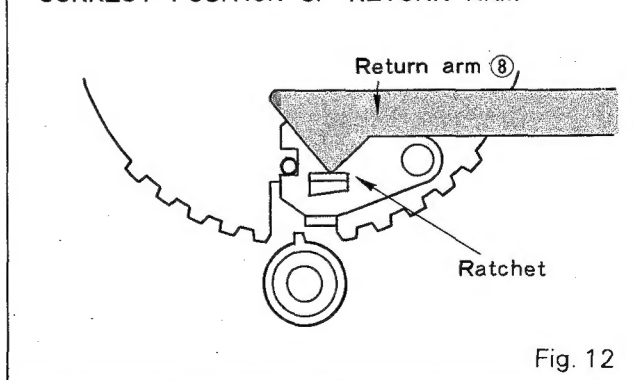


Fig. 12

TROUBLESHOOTING

1. The tone arm will not automatically return.

Remove the turntable platter and check to see that the return arm lies on the ratchet BL.

- Yes: Place the return arm to the correct position as shown in Fig. 12.
- No: Check to see the clearance between gear of motor shaft and ratchet is reasonable (Fig. 8).
 - Yes: Loosen three screws (Fig. 3) which fasten the motor shaft, and adjust.
 - No: Rotate adjusting hexagon bolt (Fig. 9) of tone arm fixing plate counter-clockwise.

2. The tone arm returns some seconds after the end of the performance.

Rotate adjusting hexagon bolt (Fig. 9) of tone arm fixing plate counter-clockwise.

3. The tone arm returns before the end of the performance.

Rotate adjusting hexagon bolt (Fig. 9) of tone arm fixing plate clockwise.

4. The turntable platter will not rotate even though the tone arm is above the record.

Check to see that the strobo light is ON.

- Yes: Check to see that $24 \pm 2V$ is available from the secondary of the transformer.
 - Yes: Check to see that 18V is available at DC output (+) in power printed circuit board.
 - Yes: Motor defective.
 - No: Check the fuses of secondary.
 - OK: Power printed circuit board ⑥2 defective.
 - No: Replace the fuse.
 - No: Check to see that the power plug is securely connected.
 - Yes: Check the fuse.
 - OK: Check the microswitch.
 - No: Replace the fuse.
 - No: Connect the plug.
- No: Check to see that proper voltage is available at the primary of the transformer.
 - No: Replace the microswitch.
 - Yes: Transformer defective.
 - No: Check the leads from the AC circuit board to the primary of the transformer.

5. The turntable platter will not stop rotating.

Check to see if the turntable will stop rotating when knob of microswitch is sufficiently pushed.

- Yes: Adjust the clearance between the knob of microswitch and tip of tone arm fixing plate to 1 mm. (Fig. 9)
- No: Check the wiring.
 - No: Replace wiring according to the circuit diagram.
 - Yes: Check the microswitch.
 - No: Microswitch defective.
 - Yes: Capacitor defective.

6. Adjustment of turntable speed cannot be made.

- Strobe indexes appear not to stand still.

Readjust semi-fixed variable resistors referring to
TURNTABLE SPEED of ADJUSTMENTS.

- No speed adjustments with variable resistor knob.

- Check the wirings including the motor servo controller circuit.
 - No: Replace wiring according to the wiring diagrams.
 - Yes: Check the variable resistor.
 - No: Variable resistor defective.
 - Yes: Check the push switch.
 - No: Push switch defective.
 - Yes: Motor defective.

7. No sound from the speaker.

Check to see that the output cords are securely connected to the amplifier (receiver).

- No: Connect the cord.
- Yes: Check to see that connections are made to the PHONO input terminals of the amplifier.
 - No: Connect to PHONO.
 - Yes: Check to see that the select switch of the amplifier is placed to PHONO.
 - No: Place select switch to PHONO.
 - Yes: Remove the headshell, touch the upper two pins at the end of the arm with a metal screwdriver and listen for the speaker to produce a humming noise. (Fig. 13)
 - No: Perform continuity test between the arm and output cords.
 - Yes: Check the connections between the cartridge and headshell.
 - No: Make correct connections.
 - Yes: Cartridge defective.

8. The tone arm will not go down even with the cueing lever in ▽ position.

Check to see that the lifter shaft ②① moves down when the cueing lever ①④ is pushed down.

- No: Replace lifter shaft assy or tone arm.
- Yes: Loosen the screw of lifter shaft and adjust the clearance between stylus point and record surface to 5–10 mm when the cueing lever is in ▽ position, referring to STYLUS POINT HEIGHT of ADJUSTMENTS.

9. The turntable is rotating but the strobo light will not light.

Check the 12 k Ω resistor which is connected with neon lamp in series.

- Yes: Neon lamp is defective.
- No: Replace 12 k Ω resistor.

PARTS REPLACEMENT

1. TONE ARM

Remove the tone arm referring to DISASSEMBLY INSTRUCTIONS, 4 step(1) to (6) and replace. To reassemble, use DISASSEMBLY INSTRUCTIONS in reverse. Adjust the tone arm referring to ADJUSTMENTS, 2 and 4.

2. MOTOR

Remove the motor as shown in DISASSEMBLY INSTRUCTIONS, 3. Replace the new motor and fasten it by screws. After replacement, check the position of motor referring to ADJUSTMENT 3.

3. LIFTER SHAFT

Remove the tone arm in accordance with DISASSEMBLY INSTRUCTIONS 4. Turn the lifter shaft clockwise as far as possible and the tone arm support can be removed, and pull out the lifter shaft from the tone arm in the direction of upward. Replace new lifter shaft after adhering 10⁵ CS silicon oil (Fig. 14). After finishing reassembling, be sure to check the gap between stylus point and record surface referring to ADJUSTMENTS, 2.

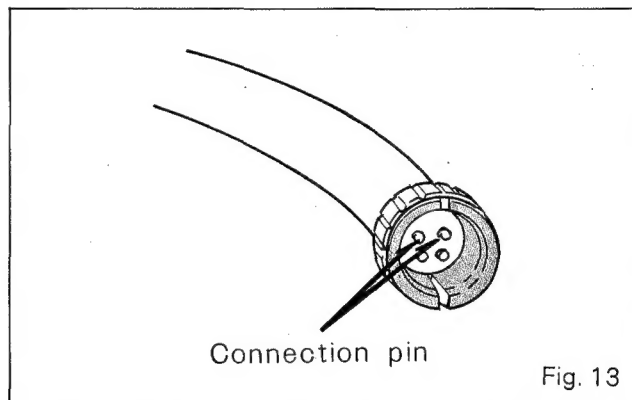


Fig. 13

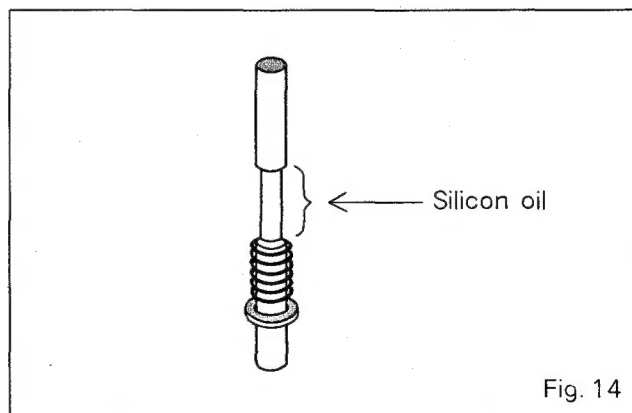


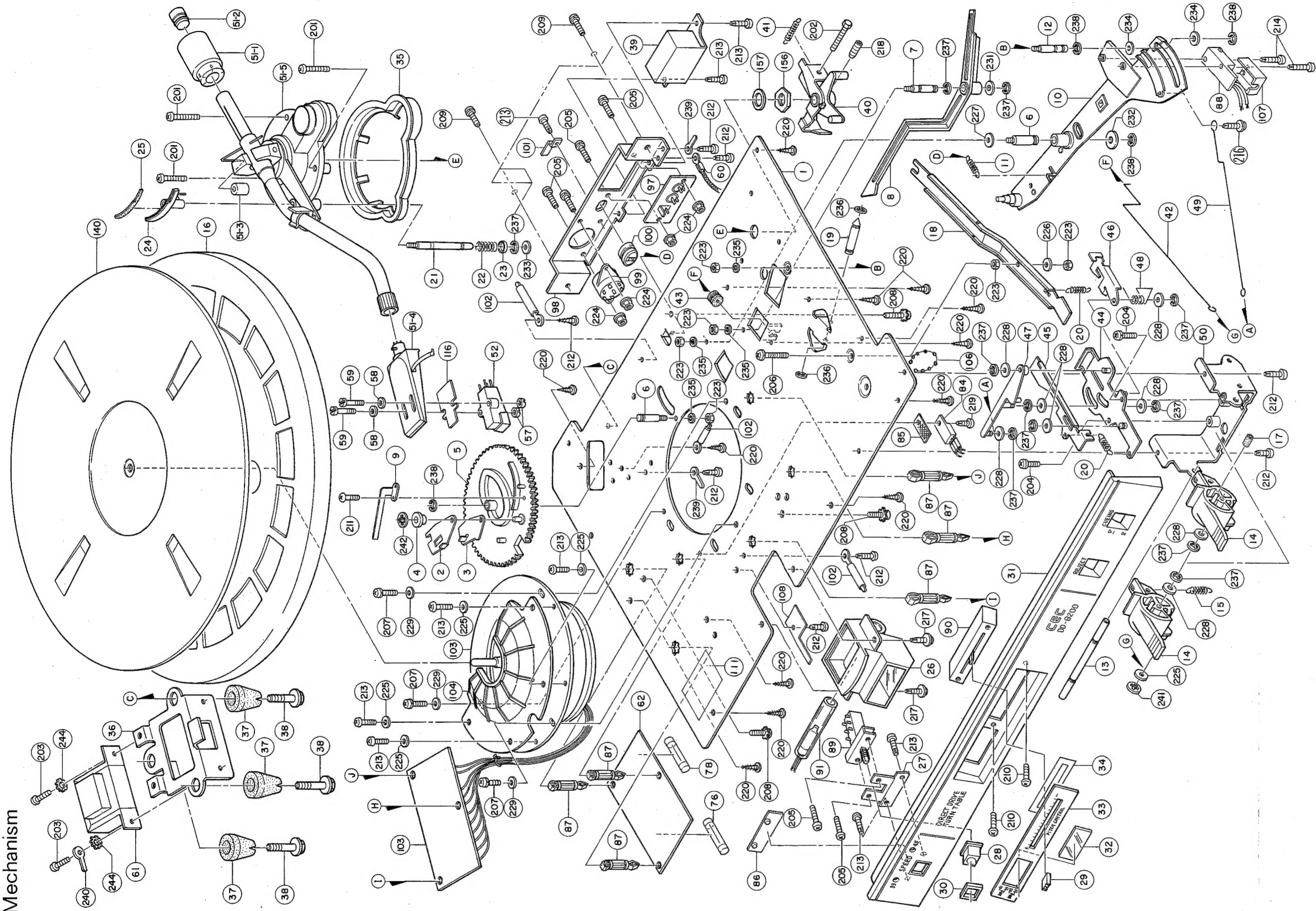
Fig. 14

PARTS LIST

Ref. No.	Parts No.	Description	Model	Ref. No.	Parts No.	Description	Model
1	C 20552s	Sub-chassis assy.		79	CF 44991	Fuse 200 mA	A. C.
2	CA 44708	Ratchet A		80	CH 43369	Fuse label	E. G.
3	CD 44709	Ratchet BL		81	CH 42906	Fuse label	A. C.
4	CB 41801	Ratchet collar		82	CH 43860	Fuse label	E. G.
5	CD 20528	Drive gear		83	CH 43547	Fuse label	A. C.
6	CB 44590	Drive gear shaft		84	CF 30401	Transistor	
7	CB 41809	Return arm shaft		85	CF 44975	Insulation sheet	
8	CD 44707	Return arm		86	CF 44804	Lamp printed circuit board assy.	
9	CA 45010	Guide plate		87	CF 30490	P. C. B. mounting spacer	
10	C 20519s	Return plate assy.	A.	88	CF 30266	Microswitch	A.
10	C 20444s	Return plate assy.	C. E. G.	88	CF 30218	Microswitch	C. E. G.
11	CE 41827	Return plate spring		89	CF 44803	Push switch	
12	CB 44697	Return plate support		90	CF 30527	Variable resistor	
13	CB 44691	Lever shaft		91	CF 43965-5	Neon lamp	
14	CD 30498-1	Cueing lever	A. E.	92	CF 30332	AC power supply cord	E. G.
14	CD 30498	Cueing lever	C. G.	93	CF 42920	AC power supply cord	A. C.
15	CE 44830	Lever spring		94	CF 44807	Output shielded cord	C. E. G.
16	CD 20525	Turntable platter		95	CF 44994	Output shielded cord	A.
17	CD 44457	Cushion stopper		96	CF 44809	DIN/RCA adapter	E.
18	CA 30496	Pushing plate		97	CF 44694	Shield connector plate	
19	CB 43918	Pushing plate pin		98	CA 44715	Terminal plate A.	A. C.
20	CE 43917	Pushing spring		98	CA 44689	Terminal plate B.	E. G.
21	CB 44679	Lifter shaft		99	CF 43533	Voltage changeover mechanism	E. G.
22	CE 41533	Spring		100	CD 43768	AC cord bushing	A. C.
23	CA 43846	Spring mounting		100	CD 44421	AC cord bushing	E. G.
24	CD 30502	Tone arm support		101	CA 43966	Protector	E. G.
25	CD 44027-1	Tone arm support rubber		102	CA 42667	Metalic cord clamping	
26	C 44801s	Neon hood assy.		103	CF 20554	Motor assy.	
27	CA 44681	Switch angle		104	CD 30500	Motor cover	
28	CD 44680-1	Speed-change button	A. E.	105		Resistor 1k Ω , 1/4w	
28	CD 44680	Speed-change button	C. G.	106	CD 43890	Plastic tie	C. E. G.
29	CD 44682-1	Pitch control knob	A. E.	107	CD 44297	Switch cover	A.
29	CD 44682	Pitch control knob	C. G.	107	CD 41833	Switch cover	C. E. G.
30	CH 44974	Fiber frame		108	CA 44982	Lamp mounting plate	C. E. G.
31	CD 20576s-2	Front panel	A	109	CA 44923	Frame B.	
31	C 20576s-1	Front panel	C	110	CD 45051	Rubber ring	
31	C 20576s	Front panel	E	111	CH 44645	Caution label	A.
32	CD 44699	Illumination window	G	112	CH 44969	Stylus change label	G.
33	CK 44685-1	Pitch control nameplate		113	CA 45036	Rumble absorbing rubber A.	
34	CK 44706	Masking cloth		114	CA 45037	Rumble absorbing rubber B.	
35	CD 30501	Frame		115	C 45012	Adapter mounting	A. E.
36	CA 44687	Transformer mounting plate		116	CA 44416	Cartridge mounting spacer	
37	CD 41875	Motor cushion rubber		117	CD 43580-0	Stylus position gauge	A.
38	CR 43201	Motor stud		118	CH 45073	Lever caution label	
39	CA 44695	Shield case		119	CH 44751	Stylus position gauge	E.
40	C 44017s	Tone arm fixing plate assy.		120	CM 20529	Cabinet	
41	CF 41817	Tone arm fixing plate spring		121	C 45124s-1	Audio-insulated leg	A.
42	CE 44820	Reject spring		121	C 45124s	Audio-insulated leg	C. E. G.
43	CD 43972	Reject spring spacer		122	CD 20446	Dust cover	
44	C 45044s	Slide plate mounting plate assy.		123	CD 44205	Dust cover cushion	
45	C 45047s	Slide plate assy.		124	CK 44884	Dust cover nameplate	A. E.
46	CA 45028	Latch-plate		124	CK 44143	Dust cover nameplate	C. G.
47	C 45048s	Reject lever assy.		125	CK 43202-1	Free-stop hinge	
48	CE 45035	Latch-plate spring		126	CK 43203	Lock plate	
49	CE 45034	Joint spring		127	CA 44690	Plain nut	
50	C 45049s	Lever mounting angle assy.		128	CA 20527	Bottom base	
51	CF 30526-1	Tone arm assy.	A.	129	CH 44399-1	Speed adjusting label	
51	CF 30526	Tone arm assy.	C. E.	130	CK 44921	Rating label	A.
51	CF 30526-2	Tone arm assy.	G.	130	CK 45007	Rating label	C.
51-1		Counterweight		130	CK 44812	Rating label	E.
51-2		Subweight		130	CH 44808	Rating label	G.
51-3		Lateralweight		131	CH 44312	Serial number label	
51-4		Headshell		132	CH 44910	Voltage label (240V)	G.
51-5		Tone arm		133	CH 44911	Voltage label (120V)	G.
52	CF 44802	Cartridge VC-10	G.	134	CH 44997	Cabinet label	A.
53		Cartridge mounting hardware	A. C. E.	135	CH 44222	Tone arm packing cushion	
54	CB 43212-1	Cartridge mounting screw	A. C. E.	136	CH 44758-2	Carton box	A.
55	CB 43212-3	Cartridge mounting screw	A. C. E.	136	CH 44758	Carton box	C.
56	CB 43212-4	Cartridge mounting screw	A. C. E.	136	CH 44758	Carton box	E.
57	CB 43213	Cartridge mounting nut		137	CD 20540	Styrol packing right side	G.
58	CD 43214	Cartridge mounting washer		138	CD 20541	Styrol packing left side	
59	CB 43212-5	Cartridge mounting screw	G.	139	CH 44759	Bottom carton plate	
60	CF 44074	Wirings		140	CD 20518	Turntable platter mat	A.
61	CF 30559	Power transformer	A. C.	140	CD 20455	Turntable platter mat	C. E. G.
61	CF 30523	Power transformer	E. G.	141	CH 44885	Return arm support	
62	C 45004s	Power printed circuit board assy.	A.	142	CH 45055	Guarantee card	A.
62	C 45005s	Power printed circuit board assy.	C.	143	CH 45065	Owner's manual	A.
62	C 44718s	Power printed circuit board assy.	E. G.	143		Owner's manual	C. E. G.
63	CF 42734	Condenser	E. G.	144	CD 30417	Parts box	
64	CF 43838	Condenser	A.	145	CH 44216	Parts box cover	
65	CF 43562	Condenser	C.	146	CK 44861-1	Oil tube	A.
66	CF 44793	Electrolytic condenser (1000 μ F, 35V)		146	CK 44861	Oil tube	C. E. G.
67	CF 44794	Electrolytic condenser (470 μ F, 35V)		147	CD 43100	45 rpm adapter	
68		Resistor 12 k Ω , 1w		148	CD 44217	Screwdriver	
69		Resistor 0.5 Ω , 1w		149	CH 44220	Polyethylene bag	
70		Resistor 82 Ω , 1/4w		150	CH 44221	Polyethylene bag	
71		Resistor 750 Ω , 1/4w		151	CH 40112	Polyethylene bag	
72		Resistor 1.6k Ω , 1/4w		152	CH 41211	Polyethylene bag	
73	CF 44795	Silicon bridge diode		153	CH 43179	Polyethylene sheet	
74	CF 44796	Zener diode		154	CH 40115	Polyethylene bag	
75	CD 43534	Spacer		155	CH 44315	WARNING label	A.
76	CF 30402-3	Fuse 1 A	E. G.	156		Tone arm mounting nut	
77	CF 44990	Fuse 1 A	A. C.	157		Tone arm mounting washer	
78	CF 30402-1	Fuse 200 mA	E. G.	158	CH 44314	CAUTION label	A.

EXPLODED VIEW

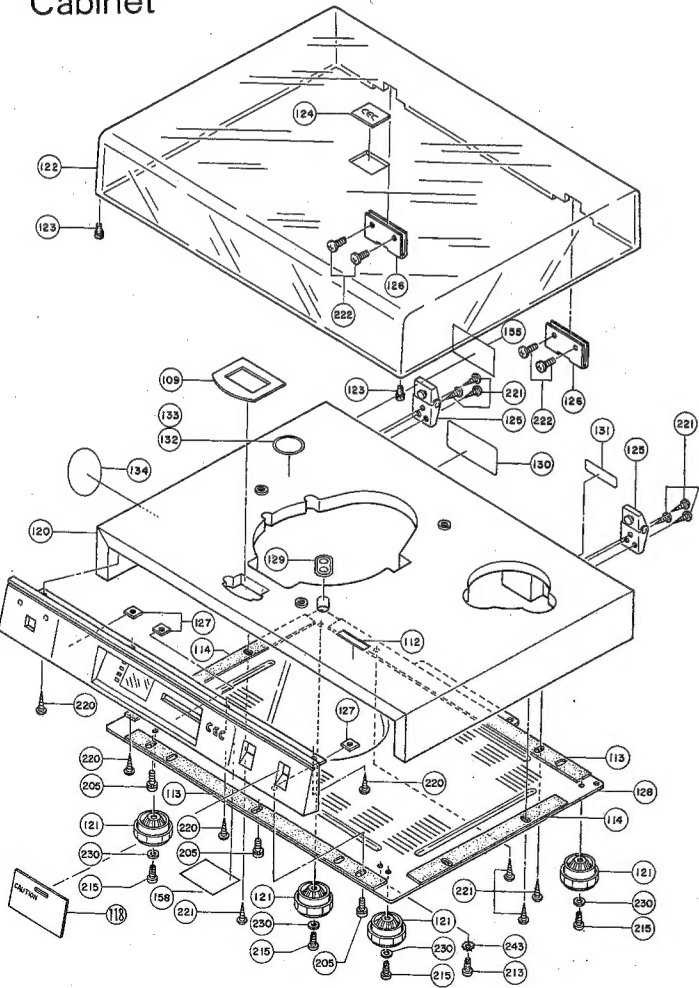
Mechanism



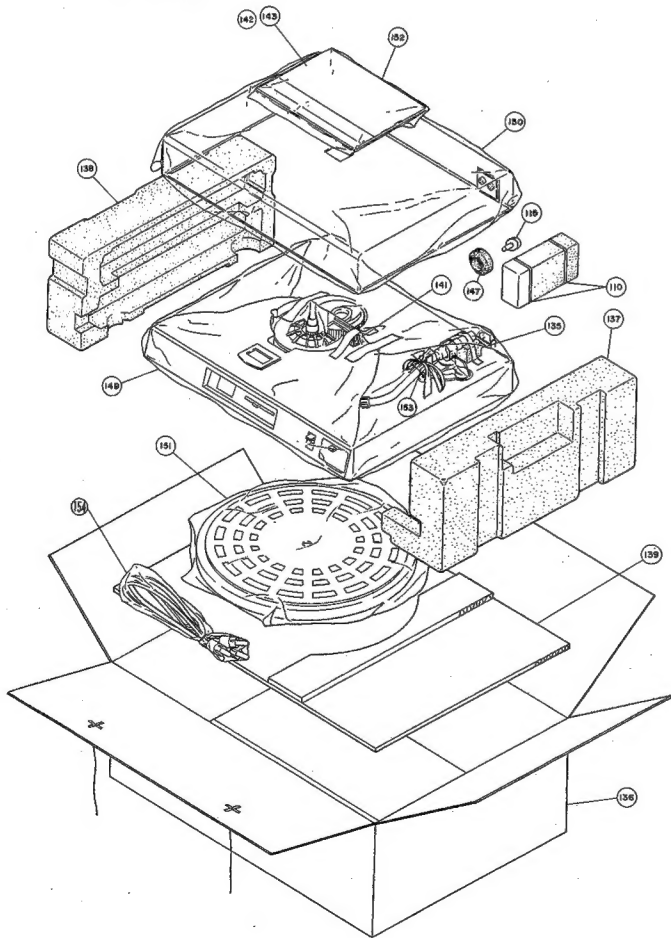
SCREWS WASHERS AND NUTS

Ref. No.	Description	Ref. No.	Description
201	⊗ Pan head screw M3x18	223	Hexagon nut M3
202	⊗ Hexagon head bolt M3 x 25	224	Hexagon nut with flange M3
203	⊗ Pan head screw M4x6	225	Plain washer (Bronze) 3φ x 8φ x 0.5t
204	⊗ Pan head Sems screw with spring washer M3x6	226	Plain washer 3φ x 10φ x 1t
205	⊗ Pan head Sems screw with spring washer M3x10	227	Plain washer 3φ x 14φ x 1t
206	⊗ Pan head Sems screw with spring washer M3x25	228	Plain washer 4φ x 10φ x 1t
207	⊗ Pan head Sems screw with spring washer M4x10	229	Plain washer (Bronze) 4φ x 10φ x 1t
208	⊗ Pan head Sems screw with toothed lock washer M5x16	230	Plain washer 4φ x 12φ x 1t
209	⊗ Pan head with plain washer M4x20	231	Plain washer 4.7φ x 10φ x 0.3t
210	⊗ Countersunk head screw M3x8	232	Plain washer 6φ x 16φ x 1t
211	⊗ Pan head tapping screw (Class 2) M3x5	233	Polyethylene washer 4φ x 10φ x 1t
212	⊗ Pan head tapping screw (Class 2) M3x6	234	Polyethylene washer 5.2φ x 12φ x 1t
213	⊗ Pan head tapping screw (Class 2) M3x8	235	Spring washer 3φ
214	⊗ Pan head tapping screw (Class 2) M3x16	236	E type washer 2φ
215	⊗ Pan head tapping screw (Class 2) M3.5x10	237	E type washer 3φ
216	⊗ Pan head tapping screw with plain washer M3x5	238	E type washer 4φ
217	⊗ Pan head tapping screw with plain washer M3x10	239	Oval lug 3φ
218	Hexagon socket headless set screw M4x5	240	Oval lug 4φ
219	Plastic screw M3x8	241	Stop ring CSTW-2
220	⊗ Brazier head tapping screw (Class 1) M3x12	242	Stop ring CSTW-3
221	⊗ Brazier head tapping screw (Class 1) (Bronze) M3x12	243	Toothed lock washer 3φ
222	Oval countersunk head screw M4x10	244	Toothed lock washer 4φ

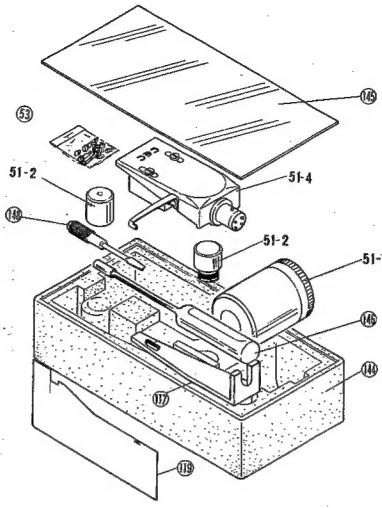
Cabinet



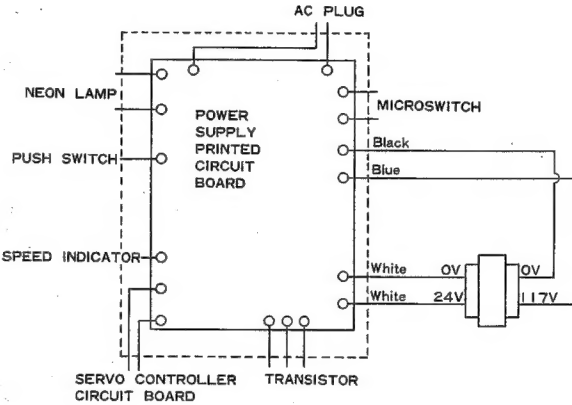
Packing



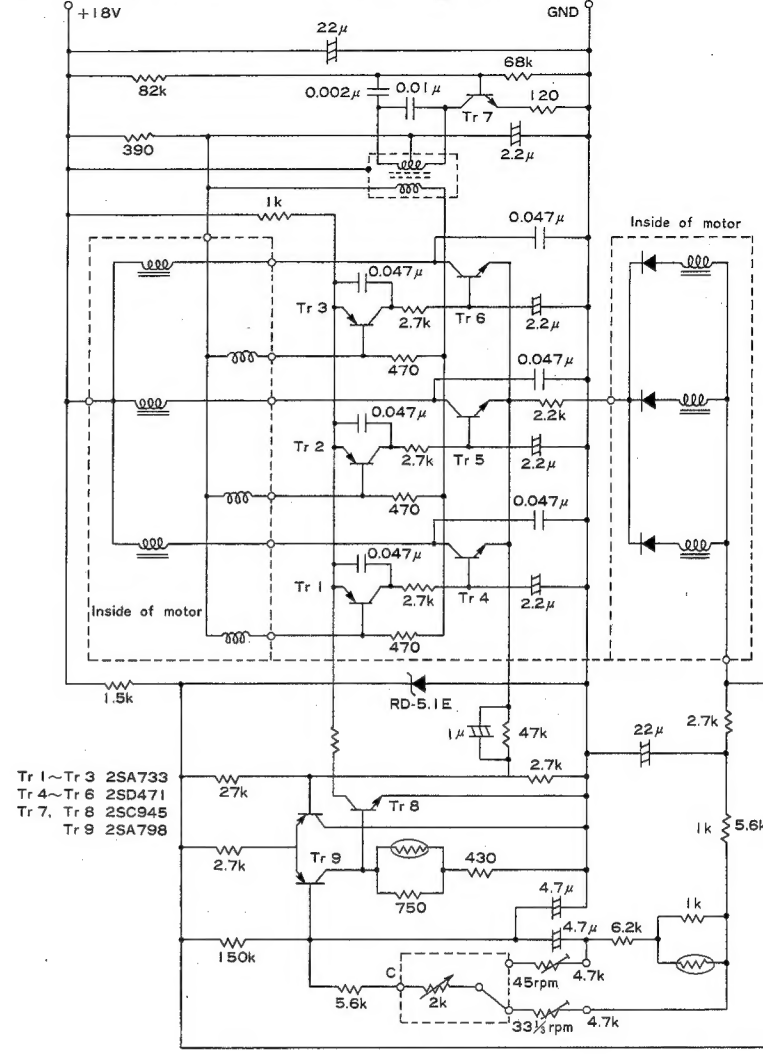
Accessory Parts



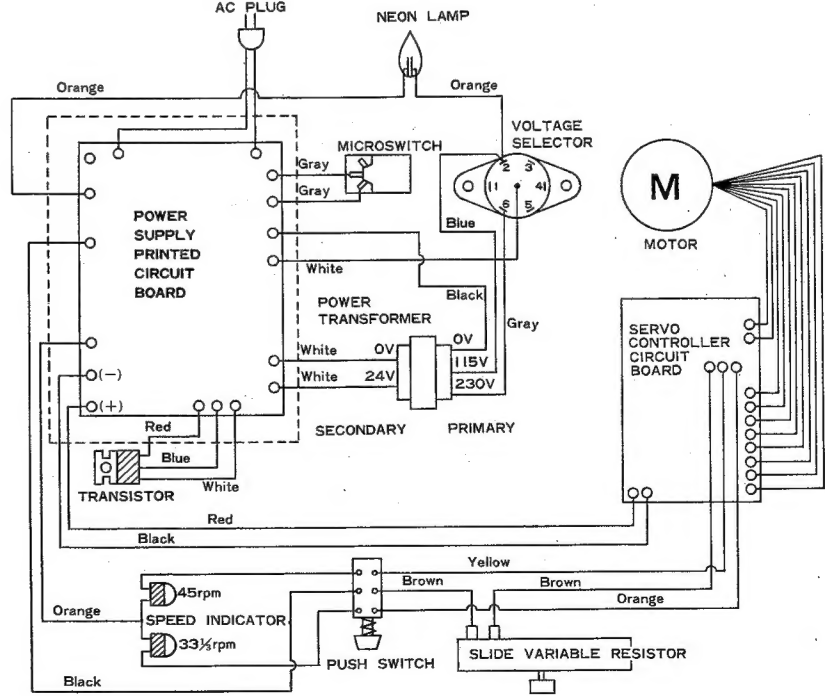
Wiring Diagrams
Model A and c



DIAGRAMS
Servo Controller Circuit Diagram

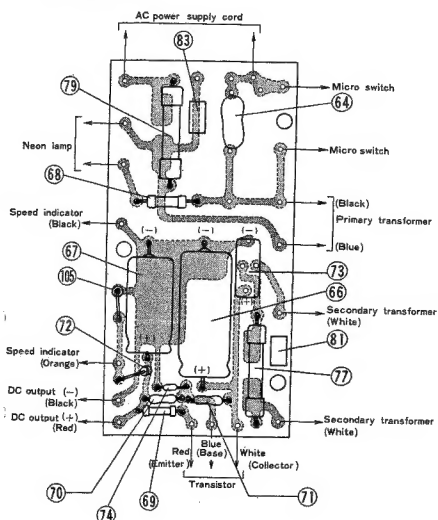


Model E and G

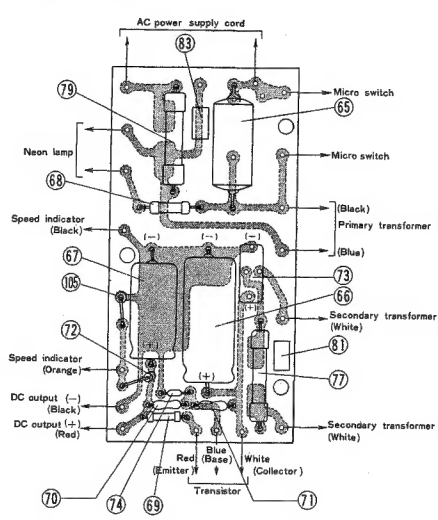


Printed Circuit Boards

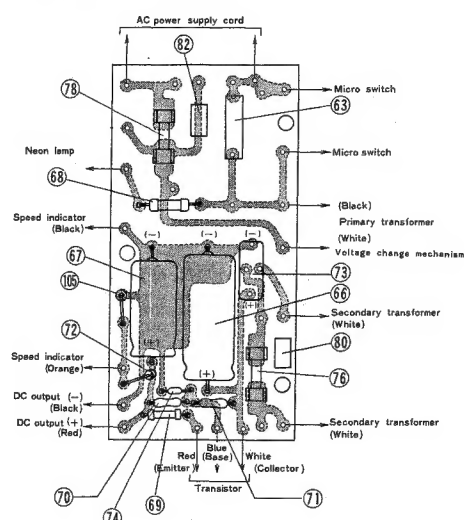
Model A



Model C

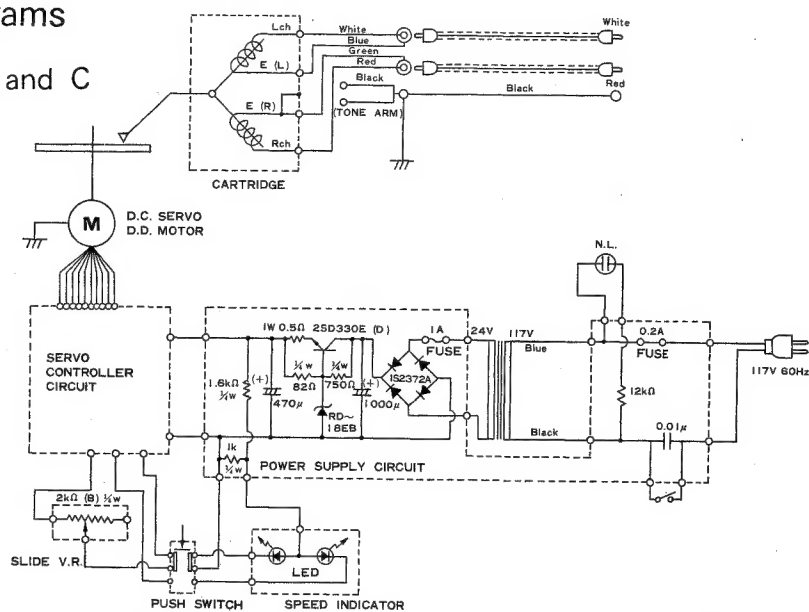


Model E and G



Circuit Diagrams

Model A and C



Model E-G

